Operational Expense Study
On Behalf of the
Rural Independent Nebraska Companies

FCC WCB Meeting

May 12, 2011

Project Goal and Resources

- Goal: Produce a statistical means to predict operating expenses* using public variables.
- Team Members:
  - Consortia Consulting of Lincoln, NE
  - Moss Adams LLP of Spokane, Washington
  - Reynolds Schultheis Consulting Co. of Hudson, Ohio
  - Vantage Point Solutions (VPS) of Mitchell, SD

* Operating expenses include: Plant-Specific Expenses, Non-Plant-Specific Expenses, Customer Expenses, Corporate Expenses and Property Taxes. Operating expenses do not include middle-mile costs or depreciation.

Data Available from Telergee Study

- Geographic data
  - Includes geographic region and state where the company is located, square miles served and number of exchanges.
- Plant data
  - Remaining life of wireline plant, net regulated wireline plant and net non-regulated plant.
- Customer and employee counts
  - Employees by job type, broadband customers, ILEC access lines and CLEC access lines.
- Revenues
  - Wireline operating revenues and non-regulated Internet revenues.
- Expenses
  - Plant-specific and plant non-specific expenses, customer expenses, corporate expenses, and property and other taxes.

Geographic Distribution of Study Data

Geographic Area	Count of Sample Companies	Distribution of Sample Companies	Distribution of All Rural Companies
Midwest – Ohio, Michigan, Indiana, Wisconsin, Illinois, Minnesota, Iowa, part of Missouri, North Dakota, South Dakota, Kansas, Nebraska, eastern Colorado	123	67%	51%
West – Western Colorado, Wyoming, Montana, Utah, California, Nevada, Idaho, Oregon, Washington, Alaska, Hawaii	33	18%	13%
Southwest- Western Texas, part of Oklahoma, New Mexico, Arizona, Nevada	9	5%	2%
South- Virginia, West Virginia, Kentucky, Tennessee, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Arkansas, Louisiana, part of Missouri, Texas, Oklahoma	14	8%	26%
Northeast- Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, New York, New Jersey, Pennsylvania, Delaware, Washington DC, Maryland	5	3%	8%
Total	184		

The Data Covers a Range of Company Size and Density

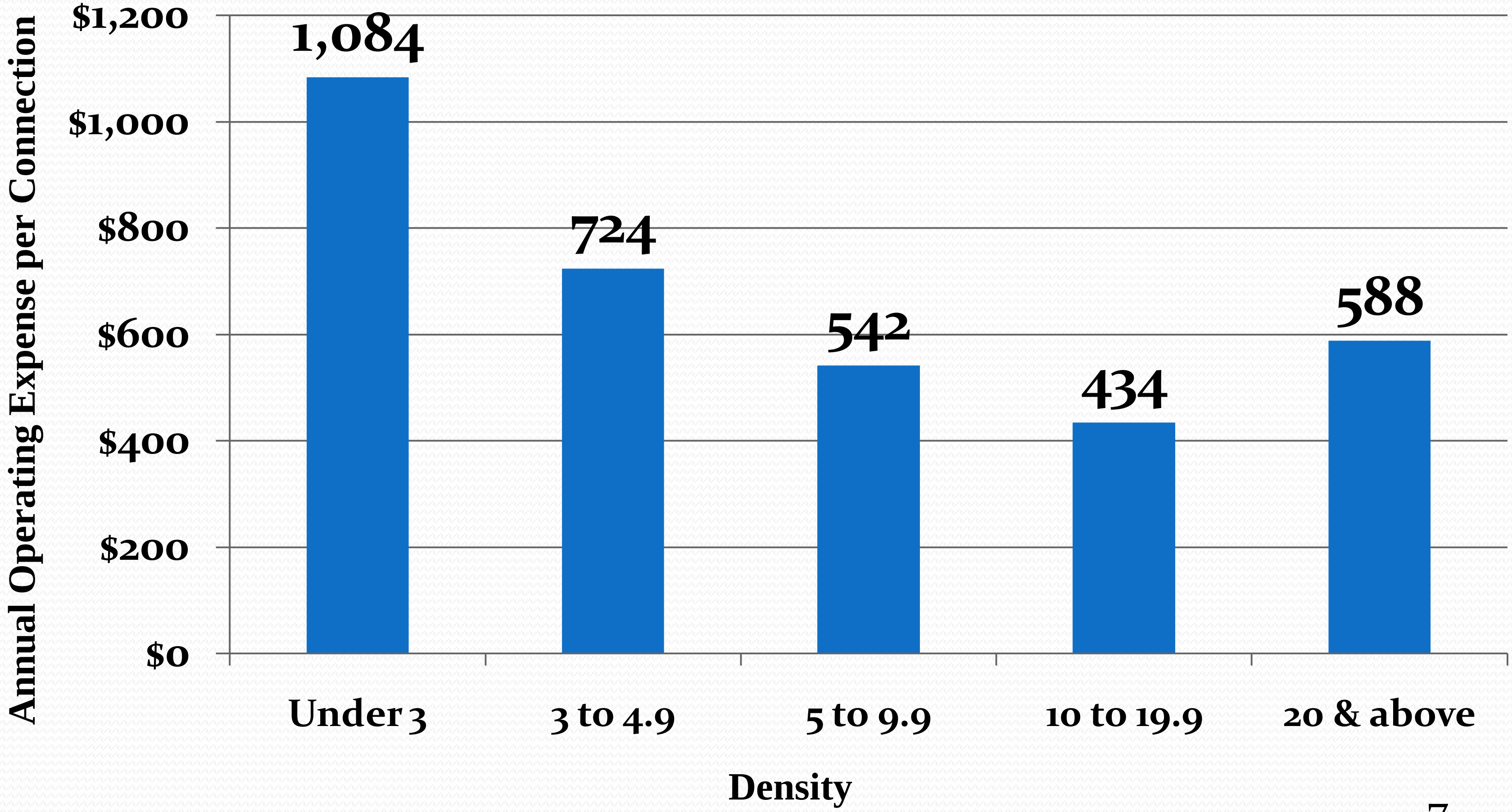
Company Size (Access Lines)	Companies
Under 1,500	57
1,500 – 5,999	81
6,000 and over	46
Minimum: 176 Maximum: 49,842	Average: 5,682

Density (Access Lines per Square Mile)	Companies
Under 3	32
3 to 4.9	13
5 to 9.9	51
10 to 19.9	26
20 and over	36
Minimum: 0.12 Maximum: 979	Average: 21.66

Regression Study

1. Tested various independent variables, both separately and in combinations, against the dependent variable, Operating Expenses per Connection.
2. State-specific variables from public sources were tested as independent variables in the regression:
   - **Median Hourly Wages by State for May 2009**—Source: Bureau of Labor Statistics, State Occupational Employment and Wage Estimates
   - **Mean Annual Wages by State for May 2009**—Source: Bureau of Labor Statistics, State Occupational Employment and Wage Estimates
   - **Median Value of Owner Occupied Housing Units for 2000 and 2005**—Source: Census Bureau. (Data that is more recent is significantly influenced by the nationwide housing crisis, so it was not tested.)
   - **State and Local Tax Burden per Capita for Fiscal Year 2009**—Source: Tax Foundation "2011 Facts and Figures. How Does Your State Compare?"
   - **State Average Population Density**—Source: 2010 Census
   - **Federal Highway Miles per Capita**—Source: Federal Highway Administration and 2010 Census

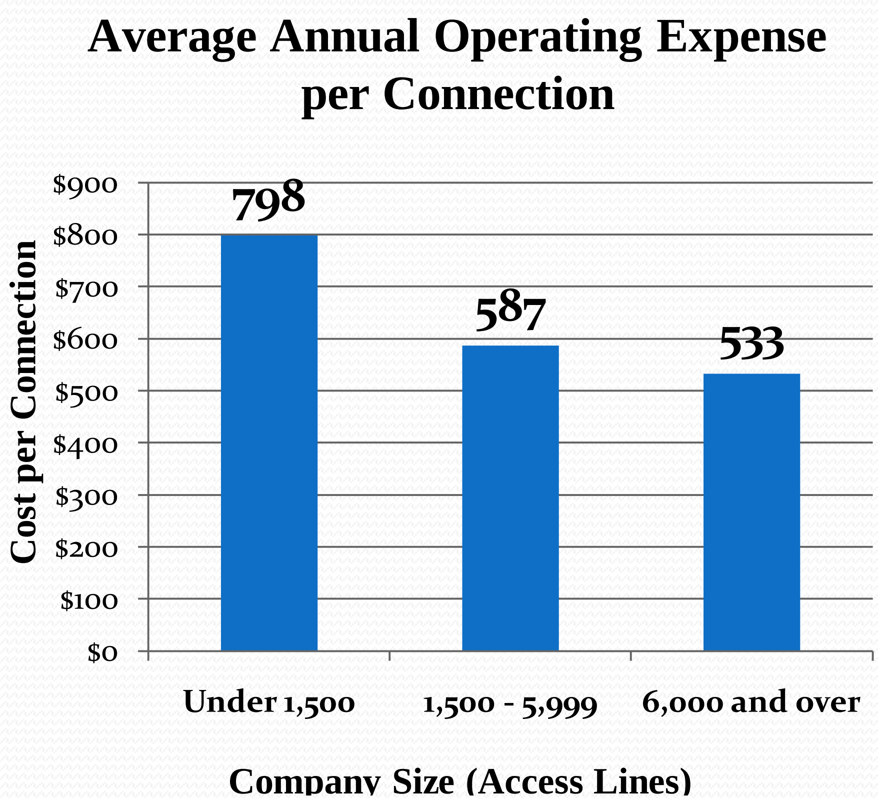
Operational Expense Is Inversely Related to Density

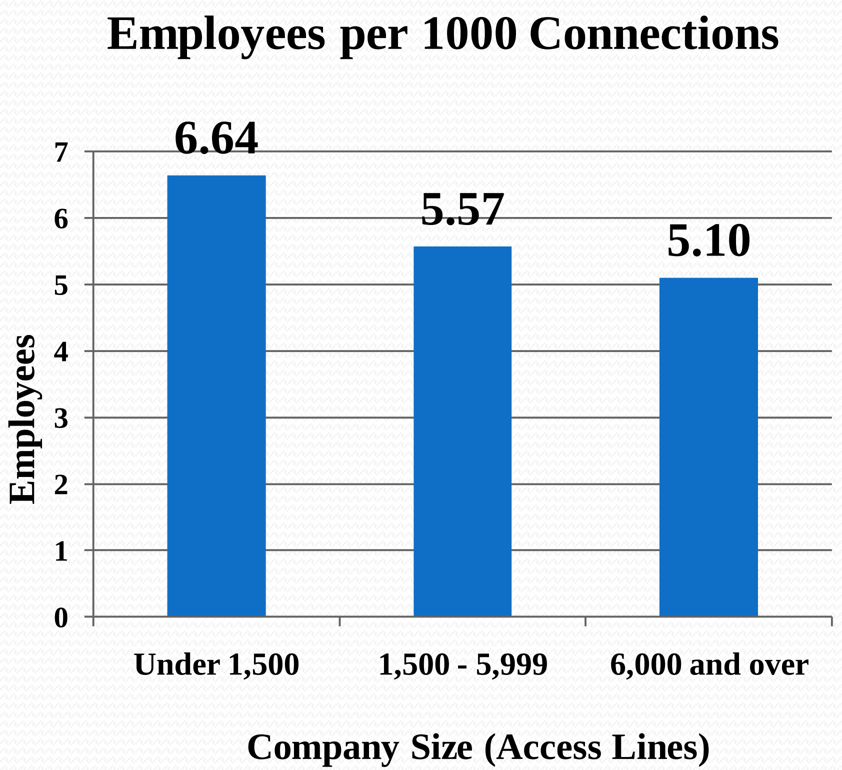


Cost Is Strongly Related to Location

Region	Count of Companies Included	Average Annual Operating Expense per Connection	Regional Percentage of Overall Average Cost
Midwest	116	$538.18	84%
West	27	$1,047.73	164%
Southwest	6	$1,043.41	163%
South	10	$437.28	68%
Northeast	5	$726.08	113%
Overall Average	164	$640.13	100%

Operating Expenses are Inversely Related to Company Size





Cost Relationships Found Within the Data Set

- Company efficiencies are achieved at relatively low numbers of connections.
- More sparsely populated companies have higher operating expenses per customer than do more densely populated companies.
- Sensitivity among variables is somewhat more complex than in the FTTH study because several variables, Density and Relative Employee Count, show a higher cost of serving sparsely populated areas.
- Other independent variables – Median Home Value by State, Net Wireline Plant and Company Size – improved results even further.
  - Median Home Value by State is a reflection of the differences in each state's cost of living.

Regression Results

Operating Expense per Connection = A + B * Square Miles Served/Access Line + C * Access Lines + D * Employees/Connection + E * Median Home Value$_{2005}$ + F * Net Wireline Plant/Access Line

Factor	Coefficient Symbol	Coefficient	T-statistic
Constant	A	-.064348	-.850673
Square Miles Served per Access Line	B	.135633	3.300278
Access Lines	C	-8.35E-6	-2.131227
Employees per Connection	D	78.78816	9.804036
2005 Median Ho me Value	E	1.5E-6	4.045639
Net Wireline Plant per Access Line	F	.024619	1.933833

NOTE: The access line variable includes both CLEC and ILEC access lines. The connections variable includes CLEC and ILEC access lines, as well as broadband connections.

Conclusions

- The final R-squared of the regression analysis is .6522, and the fit of the equation could possibly be improved with more time.
- The equation is statistically designed to represent the mean operating expenses per connection, thus some companies' operating expenses would be higher and others would be lower than the statistically derived mean.
- An additional equation would need to be statistically developed based on the variance of the sample to establish a level above the mean, if the Commission wants to put a constraint on operating expenses.

Possible Improvements

1. The sample was large enough to provide statistically valid results, however the accuracy of the results would be improved if more rate-of-return companies' data were included.
2. The results would be enhanced by expanding the sample by using a company's data from multiple survey years.
   - A data series of three to five years would be more representative of company expenses over the long term.
   - Time series data would also test the stability of the regression model over time.
3. Middle-mile transport costs should also be included in broadband operating expenses.

Potential Uses of the Results

- Develop a mathematically supported framework for predicting “reasonable” operating expenditures.
  - A streamlined process will be necessary for situations not addressed by the equation.
- Enable the Commission to consider expenses more broadly, rather than focusing on a single category of operating expenses, such as corporate operations.
- Evaluate the national ongoing cost of operating a rural broadband network.